CHAPTER 6
ENVIRONMENT

Throughout the Asia-Pacific region, rapid economic and population growth creates serious social consequences from environmental problems of urban excess, deforestation/desertification, overfishing, global warming, air pollution, and limited safe water supplies. The Asian economic crisis has aggravated this trend.[1] Economic policies have encouraged growth in some sectors while ignoring damage to others. Further, little regard is given to sustainability of the exploited resources. The social costs in terms of health, economic efficiency, and cultural dislocation are immediate, while the long-term costs of environmental rehabilitation are humbling. Left unbridled, environmental damage can lead to economic decline.[2]

Implied Taxes

Although businesses at times may prefer to avoid paying environmental costs, the costs to society of this neglect are borne nevertheless—and often at a higher per capita rate, when the unintended spin-off effects on health, infrastructure, and international relations are considered.

- China has the world's most polluted cities. Such environmental problems cost China up to 10% of its GDP.
- Other countries in the region are also burdened by a similar "tax."[3] (See Figure 6-A.)

Figure 6-A

Costs of Environmental Degradation

Country	Damage	Annual Cost ($B)	% GDP
China	Lands	13.9-26.6	3.8-7.3%
	Urban pollution	6.3-9.3	1.7-2.5%
Indonesia	Jakarta's air	2.2	2.0%
Philippines	Air, water, health	0.3-0.4	0.8-1.0%
Thailand	Air, health	1.6	2.0%

Source: Asian Development Bank

Urban Excess

Environmental problems arise from the urban by-products of transport, industrial activities, and the overcrowding of human habitation. As noted previously, economic policies have encouraged mass migration of labor to urban industries. The shift from rural to urban Asia will accelerate in the coming century, aggravating urban crowding and increasing the risk of social and political conflict. Asia's urban profile increased from 27% (0.7B people) in 1980 to 38% (1.4B) in 2000 and will rise to 50% (2.3B) in 2020.[4]

Figure 6-B

Population of Asia's Megacities[5]

City	World Rank	1995 Millions	2015 Millions
Tokyo JP	1	26.96	28.89
Bombay IN	5	15.14	26.22
Shanghai CH	6	13.58	17.97
Calcutta IN	8	11.92	17.31
Seoul KO	10	11.61	12.98
Beijing CH	11	11.30	15.57
Osaka JP	12	10.61	10.61
Delhi IN	15	9.95	16.86
Tianjin CH	19	9.42	13.53
Manila RP	20	9.29	14.66
Jakarta ID	22	8.62	13.92
Dhaka BG	23	8.55	19.49

Source: UN Population Division

To date, governments have stimulated urban migration by maintaining low food costs, which reduce rural incomes and increase the flight to the cities. About a third of the people in the Third World's cities live in desperately overcrowded slums and squatter settlements, with many people unemployed, uneducated, undernourished and chronically ill. Conditions will worsen as their numbers swell and transport, communication, health and sanitation systems break down.

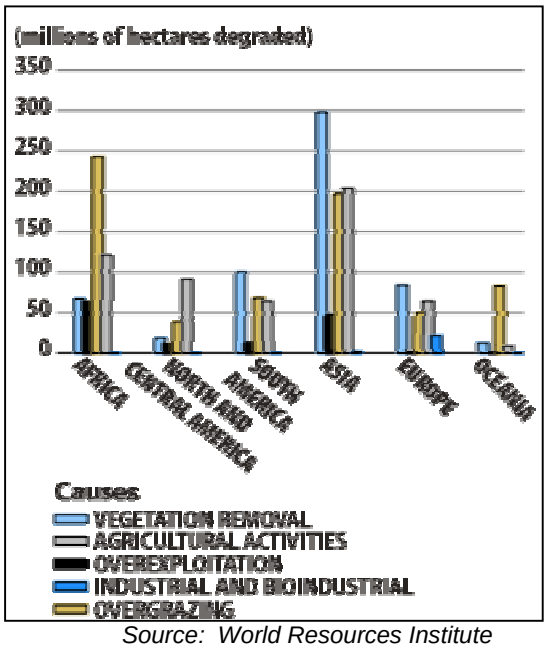
One solution to urban excesses is to divert industry and its induced labor migration away from the megacities towards surrounding areas.[6] This requires significant infrastructure investment, however, and establishes competing centers of political power.

Deforestation/Desertification

Asian food security is threatened by deforestation and desertification. More than a third of the arable land in Asia is at risk. Nearly 75% of Southeast Asia's original forest cover has been destroyed at an annual loss rate that is the size of Switzerland.[7]

The loss of forests and agricultural land is due to both the exploitation for profit and the ignorance of good practices. Isolated, rogue regimes such as Burma exploit timber, oil, and mineral resources to support their governments. Poor farmers across Asia use improper irrigation and fertilization practices, resulting in increased salinity and toxic soils.

Figure 6-C
Asia's Soil Degradation[8]



Source: World Resources Institute

Regardless of motive and method, the loss of workable land hurts not only the harvester, but also has broad consequences for his neighbors in terms of erosion, downstream flooding, and pollution. Indonesia's provinces refuse to properly manage the annual smog threatening the health and productivity of its own people as well as in neighboring Singapore and Malaysia.[9]

These failings point to an obvious need to invest in improved oversight, management, monitoring, methods, and conservation.

Landmines and Unexploded Ordnance

After years of conflict, large quantities of mines and other unexploded ordnance (UXO) litter the landscape, killing and maiming thousands of innocent victims annually.[10] The problem is most acute in Cambodia, Vietnam, and Laos. In Cambodia, one out of every 245 individuals is an amputee. Landmines and/or UXO maim or kill 100 people per month in Cambodia. Death or injury remove many victims from the work force during their productive years, further debilitating economically disadvantaged families. Landmines and UXO create vast numbers of internally displaced people, remove valuable real estate from productive use, serve as physical barriers to the movement of people, goods and services, and dramatically increase the mortality rate of both people and livestock.

Cambodia's 4 to 6 million landmines are scatter over 1,800 square kilometers, or roughly 1% of the country. Estimates are that 200,000 tons of UXO affect up to 50% of the Laotian landmass. Major projects have been delayed, and, before activities proceed, accountants must set aside up to 10% of project costs for mine clearance. Large-scale development is difficult or impossible because of landmines. Agricultural production could increase by 135% in Cambodia without the impediments of mines and UXO.

The United States has provided millions of dollars in monetary aid and has carried out or proposed a number of projects to help these countries deal with this problem. Progress toward removing all mines and UXO is slow, and may be impossible due to technical difficulties in identifying mines and UXO in the field. Areas of greatest economic value should receive highest priority for clearance, barriers need to be constructed for those areas that cannot be cleared at this time, and educational programs should be initiated. The U.S. military's unique technical knowledge helps these clearing efforts, but domestic programs need sound funding and implementation.

Water

As the demand for water grows with population and the economy, water supplies will be increasingly polluted from untreated sewage, from industrial discharges, and from salt-water intrusion of overexploited water tables.

In Jakarta, it costs $20M to $30M annually to boil water for home use. In Manila Bay, heavily polluted by sewage, fish catches have dropped 40% in the last decade. Fish catches near cities in India and China also have experienced major declines. Of Taiwan's 20 million people, less than 1 million are served by sewers. Each day in Hong Kong, about 1 million tons of sewage and industrial effluent pour untreated into the sea - a volume to fill 500 Olympic swimming pools, according to Hong Kong officials.

Projecting to 2025, water shortages will affect India, China, North and South Korea, Cambodia, Thailand, Vietnam and the Philippines.

Water disputes have affected international relations for years. Although an agreement was reached in 1996, India and Bangladesh have disagreed on the sharing of the waters of the Ganges for more than 20 years. Greater numbers of international disputes will arise and be more difficult to resolve as populations increase and economies grow, thereby placing a greater demand on scarce resources.

A domestic resource allocation problem that is common to the Pacific Islands soon will prevail over Asia: high-use agriculture will compete with populations for scarce water supplies. While more than 80% of the water consumed in Asia is used for agricultural purposes, 60 to 75% is lost to evaporation before reaching the crops. A technological solution may be to encourage the use of water-efficient drip irrigation techniques, which are employed in less than 1% of all irrigated areas.

Overfishing

Fish are a key source of food for virtually all Asian states, providing one of the largest sources of animal protein to the world's fastest growing commodity market. The world's largest tuna fishery crosses the jurisdiction of at least 21 countries—as well as extensive high-seas areas of the Pacific Ocean—and involves harvesting by fishing vessels from 26 different nations. Across the Pacific and in many coastal and riparian parts of Asia, fishing is a significant part of the economic base, providing food, employment, revenue, and foreign exchange earnings.[11]

World fisheries are being overfished as marine catches increased from 17 million metric tons (MMT) in 1950 to a peak of 87.1 MMT in 1996. As a result, there has been a steady increase in the frequency of clashes and incidents at sea caused by foreign fishing trawlers illegally encroaching into Exclusive Economic Zones and territorial seas.

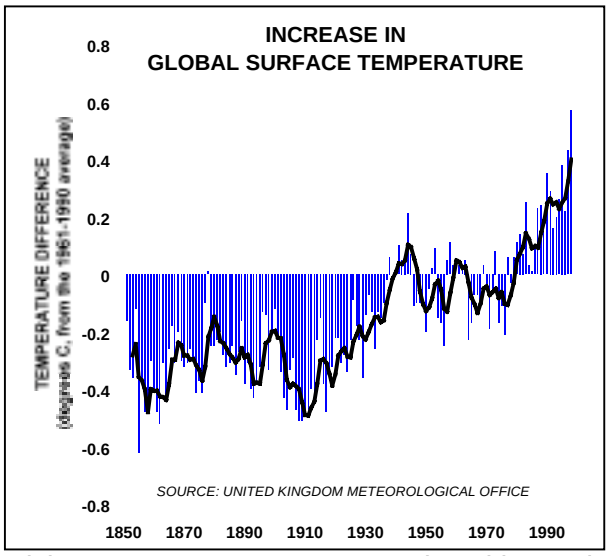
Aquaculture. Aquaculture production is a growing part of the fisheries sector. In 1996, 20% of all global fisheries production was from aquaculture. Asia dominates world aquaculture for fish, shrimp and shellfish, with China producing 68% of the global total. If done in an environmentally friendly manner, aquaculture can be a positive contributor to the world food supply. For example, giant tiger prawn production in Thailand has exploded from 900 to 277,000 tons in the last decade. However, reckless pumping of seawater into shrimp ponds can damage neighboring fields and hurt coastal marine life.

Common Regional Interests. To protect fisheries and insure sustainability, cooperative resource management schemes such as fishing quotas need to be established and enforced. Militaries, coast guards, law enforcement, and courts should cooperate to reduce the possibility of disputes, collisions, and pollution, such as negligent oil spills.

Global Warming

Carbon dioxide, chlorofluorocarbons (CFCs), methane, and nitrous oxide act like a glass in a greenhouse, letting the sun's rays in but trapping heat that would otherwise be released back into space. Carbon dioxide accounts for more than half of the warming affect, while CFCs contribute about a quarter and methane and nitrous oxide cause the remainder. Temperatures have increased .3 to .6 degrees C over the last century, consistent with the rise in greenhouse gases as predicted in recently developed computer models. Climate models predict that temperatures will be 1 to 3 degrees C higher in 2100. [12]

Figure 6-D



Rising ocean temperatures and melting polar caps will elevate sea levels by 15 to 95 cm in the next century.[13] Bangladesh could lose 17% of its land area to rising seas, while several island nations, such as the Maldives and Tuvalu will become uninhabitable or disappear. Parts of Northern Europe and Canada will benefit from better harvests, but crop yields in India could decline by 30% by 2050.

The controversial solution of the Kyoto Protocol of December 1997 places legally binding limits on greenhouse gas emissions.[14] The protocol aims to reduce emissions from developing countries to approximately 95% of their 1990 levels by the 2008 to 2012 timeframe.

Air Pollution

Air pollution from vehicles, power plants, incinerators and industry is a major problem in Asia. Outdated pollution control technology and the use of high polluting fuels compound this problem.[15]

Health. Nine of the fifteen cities with the highest particulate levels in the world and six out of the fifteen cities worst affected by sulfur dioxide are in East Asia. Air pollution in China caused more that 175,000 premature deaths in 1995 and nearly 2 million cases of chronic bronchitis. Damage to health and buildings cost Bangkok $1B annually, while air pollution in Delhi decreased crop yields by 30%.

Cross-impacts. Air pollution, in the form of acid rain, can be transported hundreds of miles by wind before being deposited through fog, rain or snow. The acidic deposition damages buildings, degrades the environment and reduces crop yields. In India, wheat growing near a power plant suffered a 49% reduction in yield compared with that grown 22 kilometers away.

Transnational interest. South Korea and Japan are concerned about economic and health effects of airborne pollutants and acid rain from coal burning power plants in nearby China. China's heavy use of air-polluting coal blurs the distinction between domestic economics and transnational threats.

Technology. The developed countries have dramatically reduced the amount of pollutant emissions in the last 20 years through the implementation of new technologies. Widespread use of these proven technologies in developing and advanced Asian economies, coupled with cleaner burning fuels such as unleaded gasoline, natural gas and low sulfur coal can reduce total emissions regardless of rising energy consumption.

Implications for Cooperation

Since trade has a significant effect on environmental conditions, the World Trade Organization (WTO) is making efforts to address these problems in a multilateral forum. Also, the APEC forum is discussing environmental policy, technologies, sustainability, and education and information.

Countries are increasingly participating in global and regional conventions on atmosphere and oceans, protection of wildlife and habitat, and the handling of hazardous substances. The United Nations and the World Bank are providing aid through the Global Environment Facility (GEF) for countries suffering from spillover pollution of neighboring countries.

- Fledgling regional organizations are develop a dialog for resolving contentious issues by discussing environmental management; nature conservation; industrial, marine, and urban settings; and education, training, and information.
- Among these organizations are ASEAN, the South Asia Cooperative Environment Program (SACEP), the South Pacific Regional Environment Program (SPREP), and the Lower Mekong Basin Development Environment Program (LMBDEP). The latter organization links economic cooperation and development in Laos, Vietnam and Thailand, addresses food and power production, flood control, and navigation in the lower Mekong River basin.

Conclusions

Environmental issues are an underlying—and often neglected—cause for conflicts, disasters, or dislocations.

Militaries in the region may be called upon not only to resolve conflicts, but—like the U.S. Army Corps of Engineers—to use their organizational skills and resources to address both crisis relief and long-term issues of security and infrastructure.

Further—at the micro-economic level—each country's military faces a broad array of environmental challenges from the impact of their infrastructure and operations. The U.S. military is highly skilled in confronting these challenges. By sharing these environmental security practices with other countries, the U.S. military promotes good governance and sets an example for reducing environmental threats.

Endnotes

1 World Bank, *Environment Matters*, September 1999 (www.essd.worldbank.org/)
2 Auger, John; Butts, Kent H.; Semple, Mary Jane; Kistler, James E. in Asia-Pacific Center for Security Studies (APCSS)*, Conference Report for Environmental Change and Regional Security*, Sept 1997; World Bank East Asia Environment and Social Development Unit, *Environmental Implications of the Economic Crisis and Adjustment in East Asia*, January 1999 (www.worldbank.org/html/extdr/offrep/).
3 United Nations Development Programme, *Human Development Report 1998*, 1998.
4 World Resources Institute, *World Resources 1998-99*.
5 UN Population Division, *Urban Agglomerations 1950-2015 (1996 Revision).*
6 National Economic and Social Development Board of Thailand, *Eighth National Economic and Social Development Plan (1997-2001).*
7 Deanna Donovan, *Strapped for Cash, Asians Plunders their Forests and Endanger their Future,* East-West Center, April 1999.
8 World Resources Institute, *World Resources 1998-99* (www.igc.org/wri/wri-98-99/soiloss.htm).
9 Jefferson M. Fox, *How Blaming 'Slash and Burn' Farmers is Deforesting Mainland Southeast Asia*, East-West Center Analysis No. 47, December 2000.
10 U.S. Department of State, *Hidden Killers 1998: Global Landmine Crisis* (www.state.gov/www/global/arms/); and United Nations, *Demining Database* (www.un.org/Depts/Landmine/open.html).
11 Asia-Pacific Economic Cooperation Working Group on Fisheries (www.apecsec.org.sg/workgroup/fish vision.html); Sam Bateman, "East Asia's Marine Resources and Regional Security", *Journal of Maritime Studies*, 1996; UN Food and Agriculture Organization, *The State of the World Fisheries and Aquaculture 1998* (www.fao.org/docrep/w9900e/ w9900e00.htm); and United Nations Development Programme (UNDP), *Human Development Report 1998*, 1998.
12 World-Wide Fund for Nature, *WWF Atlas of the Environment;* Intergovernmental Panel on Climate Change, *The Regional Impacts of Climate Change*. (www.epa.gov/globalwarming/reports/pubs/ipcc/); Meteorological Office of the United Kingdom, *Combined Land, Air and Sea Surface Temperature Anomalies for the Globe*, 1999 (www.meto.gov.uk/ sec5/CR_div/Tempertr/lsst_vals_globe.html). Vincent Gray criticized the report for biased measurements near industrial areas in "The Cause of Global Warming", *Energy and Environment*, June 2000
13 Leo A. Falcam, "Death By Warming", *Honolulu Advertiser*, August 12, 2001.
14 Energy Information Administration*, Analysis of the Impacts of an Early Start for Compliance with the Kyoto Protocol*, July 1999 (www.eia.gov/oiaf/kyoto3/).
15 APCSS, *ibid*; World Bank, *ibid*.